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16 February 2018

VIA Electronic Comment Filing System (ECFS)

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW, Room CY-A257
Washington, D.C. 20554

Re: Notice of *Ex Parte* Presentation, IB Docket No. 17-95, *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*

Dear Ms. Dortch,

On 15 February 2018, Jack Wengryniuk and the undersigned of Inmarsat met with Jose Albuquerque, Stephen Duall, Chip Fleming, Cindy Spiers of the International Bureau to discuss the above reference proceeding. Paul Blais of the International Bureau and Jonas Eneberg of Inmarsat participated via teleconference. The attached presentation formed the basis of the discussion.

Respectfully submitted,

/s/ Giselle G. Creeser
Giselle G. Creeser
Director, Regulatory
Inmarsat

Enclosures

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The mobile satellite company™

FCC ESIM PROCEEDING

15 February 2018

Overview

- Inmarsat supports including ESIM use of 29.25-29.3 GHz as proposed by the Commission
- Inmarsat's analysis (exparte filed 6 Nov 17) despite being conservative, shows that it is possible to define an area around NGSO MSS feeder link earth stations (an "exclusion zone") outside of which ESIMs can operate freely while protecting the feeder link station operations
- Inmarsat's network keeps track in real time of the precise location of all ESIMs in operation and can inhibit their operation in defined areas
- Prohibiting ESIMs from using this band, as proposed by Iridium, is unnecessary and would reduce spectrum efficiency and deprive ESIM operators of valuable additional spectrum access

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Inmarsat's Analysis is Valid and Conservative

- Iridium correctly describes Inmarsat's modelling approach as "an iterative, trial and error method to calculate, for eight different azimuths, an adequate separation distance from the Iridium gateway"
- Inmarsat used three closely spaced ESIMs at each azimuth, on separate frequencies within one Iridium channel, to arrive at a worst case number of in-line events and therefore a worst case "exclusion distance" for each azimuth
- The distances along these eight azimuths define a rough worst case "exclusion zone"
  - Additional azimuths could be added to improve the granularity of the result
- At any time there is likely to be only one ESIM operating on any frequency in the area surrounding the exclusion zone – this would be dependent on the size of the exclusion zone, the size of a satellite beam, and the fact that adjacent beams do not operate on the same frequency
- The results of Inmarsat's simulations show that the interference statistics improve continuously as the ESIMs are moved further away from the Iridium gateway
  - The number and impact of inline events are worst at the edge of the exclusion zone and reduce further away
  - This applies in all directions from the Iridium gateway and at any ESIM height (e.g. 0m or 10,000m)
- The results also show that land-based and aero exclusion zones will be very similar

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Inmarsat's Analysis is Valid and Conservative

- Modelling based on continuous transmission from fixed ESIM locations is a conservative approach for establishing exclusion distances
  - The consideration of non-continuous/non-simultaneous transmissions from multiple ESIMs and/or the movement of ESIMs outside the exclusion zone can only improve the situation
- Even the unrealistic scenario of multiple ESIMs all positioned along the boundary of the worst case exclusion zone and transmitting at different times would meet the protection criteria
  - For this unrealistic case, the resulting interference statistics would be a combination of the individual interference statistics for the different points on the boundary, which are all very similar and all meet the protection criteria
  - In practice, of course, ESIMs would be transmitting from different points outside the exclusion zone and would only occasionally approach the boundary

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Inmarsat's Analysis is Valid and Conservative

- Inmarsat's detailed simulations show that the difference in shape and size of an exclusion zone at ground level and at 10,000m is minimal
  - Iridium claims that "the actual 3D exclusion zone will be the composite of various cone-shaped interference reception zones oriented towards the receiving Iridium satellite"
  - However, considering the relative heights of Iridium satellites and aero terminals, helps to explain why the exclusion zones at ground level and at 10,000 m are very similar (see simple diagram on next slide)
- Iridium highlighted that Inmarsat derived an exclusion zone only for one satellite network whereas an Iridium gateway will see many different satellites and there will be a need for a unique exclusion zone for each satellite that communicates with ESIMs
  - Iridium then goes on to catastrophize the situation by claiming that all ESIMs would have to respect the composite exclusion zone of all satellites
- Clearly, an ESIM operating with a particular satellite will only have to comply with the exclusion zone that applies to that particular satellite

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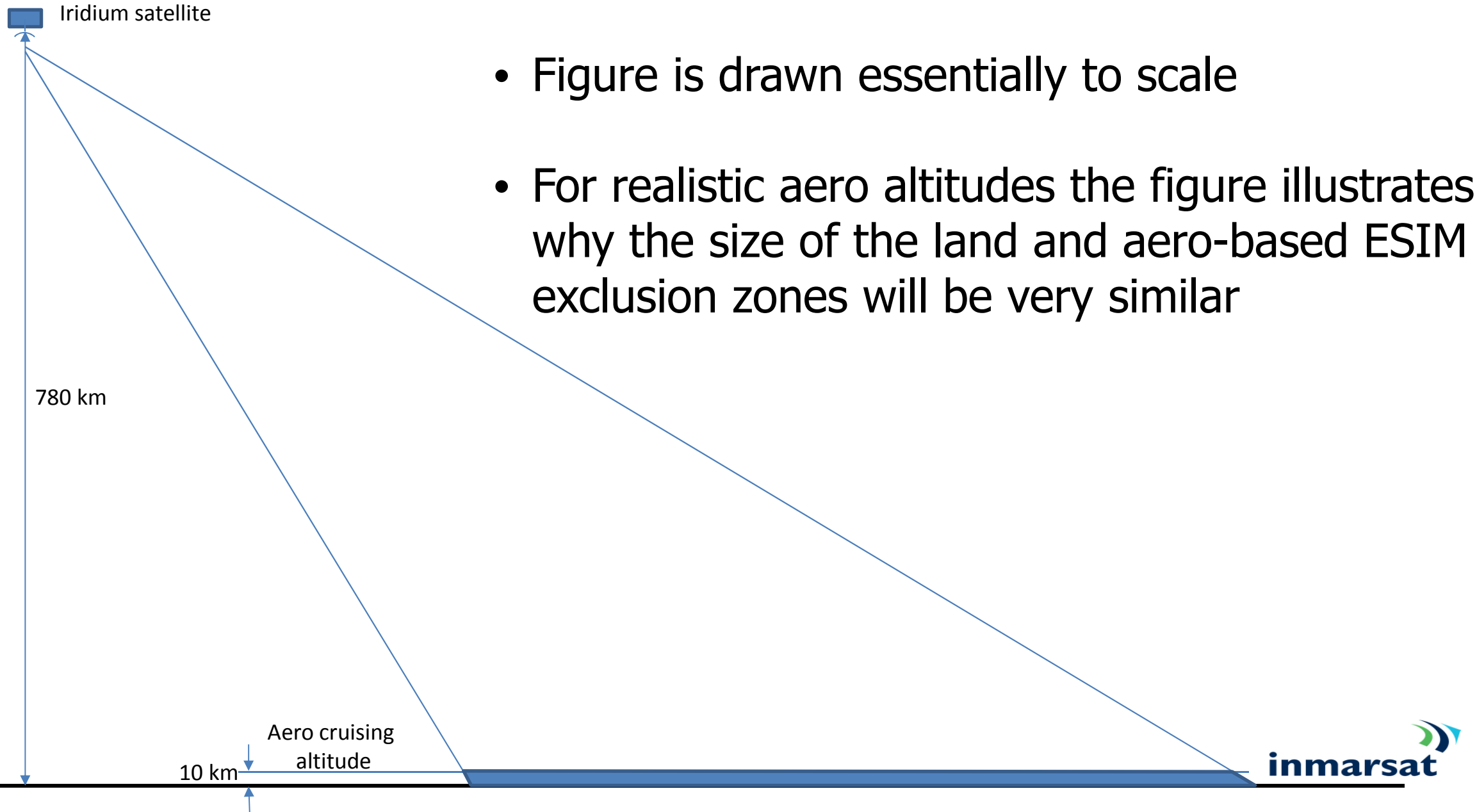
Comparison of ESIM and Iridium Satellite Heights



- Figure is drawn essentially to scale
- For realistic aero altitudes the figure illustrates why the size of the land and aero-based ESIM exclusion zones will be very similar

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Iridium's attempts to overly complicate ESIM operations in the 29.25-29.3 GHz band are unfounded

- FCC blanket earth station licenses in the 29.25-29.3 GHz band already allow operation of a large number of VSAT stations subject to coordination under §25.258
- There are already coordination agreements in place with Iridium for this band, and as coordination of ESIM can be similarly achieved this process should not require considerable FCC time
- The facts are that Iridium has three feeder link stations in 29.25-29.3 GHz band in the US and only one in CONUS and that it is totally feasible to coordinate ESIM operations with those stations

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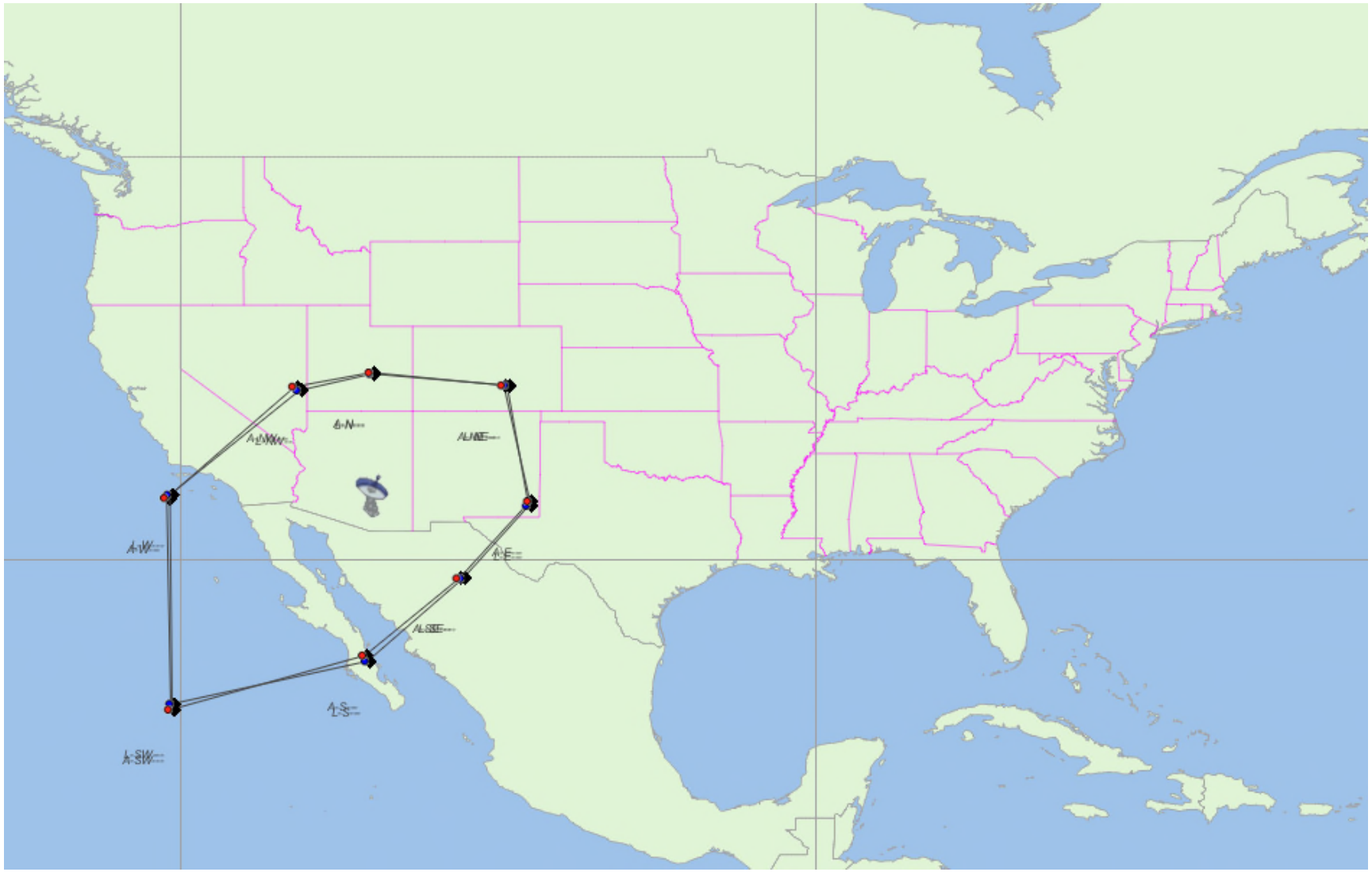
Example Exclusion Zone in the US



Summary

- Iridium has a very limited number of feeder link earth stations
- Inmarsat's detailed worst case analysis demonstrates that it is possible to define an area around an NGSO MSS feeder link earth station (an "exclusion zone") outside of which ESIMs can operate freely while protecting the feeder link station
- The exclusion zones for land based and Aero ESIMs are very similar
- Since such an exclusion zone can be defined, successful coordination of ESIMs is possible
- Given the above, the Commission should allow ESIM operations in the 29.25-29.3 GHz band subject coordination under §25.258, as proposed in the NPRM

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